

Current Status of Conventional (Open) Cholecystectomy Versus Laparoscopic Cholecystectomy

For the past century, open cholecystectomy has been the conventional method, or gold standard, for the treatment of patients with symptomatic gallstones. First performed in France in 1987, laparoscopic cholecystectomy was introduced in the United States in 1988. During the past 5 years, laparoscopic cholecystectomy has caused a monumental change in general surgery by effecting a trend toward minimally invasive surgical procedures. Although it has become the procedure of choice throughout most of the world for patients with symptomatic gallstones, some concerns exist, including iatrogenic injury to the extrahepatic biliary tract, the management of choledocholithiasis, cost of the procedure, longer duration of the operation, the cost of training surgeons, and availability of patients to teach surgical residents the technique of open cholecystectomy.

The advantages of laparoscopic cholecystectomy are decreased pain and disability and improved cosmesis without increased mortality or morbidity rates. Mean hospital stay for this procedure is 1.6 days (median, 1 day), *versus* 4.3 days for open cholecystectomy. The mean time for return to work is 15 days for patients undergoing laparoscopic cholecystectomy (median, 10 days) *versus* 31 days (median, 28 days) for patients undergoing open cholecystectomy.¹ Measurement of biochemical stress parameters have shown lower values of epinephrine, norepinephrine, interleukin-1- β and interleukin-6 during and after surgery for patients who have undergone laparoscopic *versus* conventional cholecystectomy.²

Shorter hospital stay and quicker resumption of normal activities, including return to work, have been reported after laparoscopic cholecystectomy. Marketing forces for short (or no) length of hospital stay and the public have demanded laparoscopic cholecystectomy instead of the open procedure. This has prevented prospective randomized trials between laparoscopic cholecystectomy and conventional cholecystectomy. Such a trial

seems impossible, but retrospective studies have been reported.³ A significant reduction in the incidence of wound complications was seen in patients undergoing laparoscopic cholecystectomy as well as a lower incidence of postoperative ileus and pulmonary complications.

The incidence of injuries to the bile ducts has increased with laparoscopic cholecystectomy. These injuries may be life threatening, prolong hospitalization, and increase cost and litigation. The incidence of bile duct injuries after open cholecystectomy is reported to be 0.125% *versus* 0.3% to 0.5% for laparoscopic cholecystectomy (a 2.5-fold to fourfold increase).⁴ With the advent of laparoscopic cholecystectomy, more gallbladders are being removed, with an estimated 85% done by the laparoscopic technique. Approximately 500,000 cholecystectomies are performed annually in the United States. An estimated 1500 to 2000 injuries occur each year in the United States due to laparoscopic cholecystectomy, related to the experience of the surgeon. Most injuries occur during the learning curve, which is believed to take place during the first 13 laparoscopic cholecystectomies performed.⁵ As the surgeon gains experience, the incidence of bile duct injuries decreases but still occurs, even after the surgeon's first 50 laparoscopic cholecystectomies. Most injuries are due to aberrant anatomy of the bile ducts, indicating that operative cholangiography to map out the extrahepatic ductal system might prevent these injuries.

The time-honored method of open cholecystectomy, popularized by the late Dr. Frank Glenn, involved dissecting out the cystic duct and cystic artery, encircling each structure with a Potts vessel loop tie, and then separating the gallbladder from the liver bed beginning at the fundus until the gallbladder was attached only by the cystic artery and cystic duct. An intraoperative cholangiogram through the cystic duct was done before ligation of the cystic duct and removal of the gallbladder. If the

surgeon had initially mistaken a right hepatic duct or the common bile duct for the cystic duct, then the Potts tie could be removed without injury to the bile duct and placed correctly on the cystic duct.

The laparoscopic technique begins with dissection of the cystic duct and artery and proceeds toward the fundus. However, an intraoperative cholangiogram before division of the cystic duct may aid in proper identification of the bile duct anatomy as well as visualization of common bile duct stones.

The management of stones found in the common bile duct during laparoscopic cholecystectomy is controversial. Surgeons experienced with laparoscopic techniques have explored the common bile duct through the cystic duct or directly through a choledochostomy. The equipment necessary for common bile duct exploration is expensive, and many hospitals cannot afford to have such supplies available. Some surgeons will convert to an open procedure with common bile duct exploration and stone extraction. Others hope that the stones will pass spontaneously and, if this fortuitous event does not occur, depend on endoscopic sphincterotomy to clear the stones.

Criticism has been leveled at laparoscopic cholecystectomy because of the cost of the instruments and duration of the operation. Indeed, the costs incurred for laparoscopic cholecystectomy in the operating rooms exceed the costs incurred for open cholecystectomy. However, overall costs of the former are less because of decreased hospitalization and earlier return to work. Efforts to reduce the cost of laparoscopic instruments should be continued. The duration of laparoscopic cholecystectomy decreases with experience. Studies showed that the surgeon's first 10 laparoscopic cholecystectomies usually exceeded 2 hours, some extending to 4 hours, but that after 50 or more laparoscopic cholecystectomies the operative time was less than 2 hours in 86% of cases.

When laparoscopic cholecystectomy was introduced, many surgeons were almost self-taught and began the operation after attending weekend courses. The Society of American Gastrointestinal Endoscopic Surgeons established guidelines for training courses in laparoscopic surgery and for hospital privileges to perform laparoscopic cholecystectomy. These guidelines were reviewed and distributed by the American College of Surgeons. Almost all surgeons younger than 60 years of age performing laparoscopic cholecystectomy are now trained and experienced. Surgical residents in accredited training programs have sufficient experience to be qualified to perform laparoscopic cholecystectomy. Our chief surgical residents will have performed more than 50 laparoscopic cholecystectomies before completing their training.

Long-term follow-up of patients undergoing laparoscopic cholecystectomy should be ongoing. The experi-

ence with this procedure extends only to 5 years. Experience of open cholecystectomy has shown a progressive restenosis rate after repair of bile duct injury. Late reports are not yet available, but in a series of 50 patients with bile duct injuries after laparoscopic cholecystectomy, 25 underwent hepaticojejunostomies, 5 of whom required an additional operation soon thereafter.⁴

Is there still a role for open cholecystectomy? Yes, for those patients for whom it will likely be difficult to dissect out the biliary structures. Laparoscopic cholecystectomy should not be performed for patients who have had multiple operations in the upper abdomen resulting in scarring, adhesions, and inflammation. Conversion from laparoscopic cholecystectomy to an open procedure should be done without hesitation in the presence of an inflammatory mass in the right upper quadrant that precludes clear visualization. Surgeons must recognize their limitations and not hesitate to convert to an open procedure. This reflects sound surgical judgment. Open cholecystectomy is also performed for patients with bleeding problems from coagulation defects and for patients with bowel distention or obesity resulting in a fatty omentum. Open cholecystectomy remains a safe and effective operation for symptomatic gallstones. Laparoscopic cholecystectomy must be judged against this standard, as stated by the National Institutes of Health consensus report on laparoscopic cholecystectomies.⁶

The increase in the number of cholecystectomies performed since the introduction of laparoscopic cholecystectomy has raised the issue of whether too many unnecessary cholecystectomies are now being performed. The Minnesota study indicated that all the operations were justified.¹ A recent review in one hospital revealed that in 120 laparoscopic cholecystectomies (30% of the total), no gallstones were found. The excised gallbladders were diagnosed as acalculus chronic cholecystitis. Quality assurance studies with continuing follow-up are needed.

Nevertheless, laparoscopic cholecystectomy has become the procedure of choice for patients with symptomatic gallstones and can be performed safely in most circumstances by properly trained, experienced surgeons who are willing to convert to an open cholecystectomy whenever the laparoscopic cholecystectomy becomes compromised. Jatzko, in using a multivariate comparison of laparoscopic and open cholecystectomy, concluded that "laparoscopic cholecystectomy can be performed safely with an overall complication rate that is distinctly lower than that of open cholecystectomy."⁷ Laparoscopic cholecystectomy has replaced conventional cholecystectomy as the gold standard.

John L. Sawyers, M.D.
Nashville, Tennessee

References

1. Kane RL, Lurie N, Borbas C, et al. The outcomes of elective laparoscopic and open cholecystectomies. *J Am Coll Surg* 1995; 180:136-145.
2. Glaser F, Sannwald GA, Buhr HJ, et al. General stress response to conventional and laparoscopic cholecystectomy. *Ann Surg* 1995; 221:372-380.
3. Williams LF Jr., Chapman WC, Bonau RA, et al. Comparison of laparoscopic cholecystectomy with open cholecystectomy in a single center. *Am J Surg* 1993; 165:459-465.
4. Strasberg SM, Hertl M, Soper NJ. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. *J Am Coll Surg* 1995; 180:101-125.
5. Meyers WC, Club TSS. A prospective analysis of 1518 laparoscopic cholecystectomies. *N Engl J Med* 1991; 324:1073-1078.
6. National Institutes of Health Consensus Development Conference Statement on Gallstones and Laparoscopic Cholecystectomy. *Am J Surg* 1993; 165:390-396.
7. Jatzko GR, Lisborg PH, Perth AM, et al. Mutivariate comparison of complications after laparoscopic cholecystectomy and open cholecystectomy. *Ann Surg* 1995; 221:381-386.